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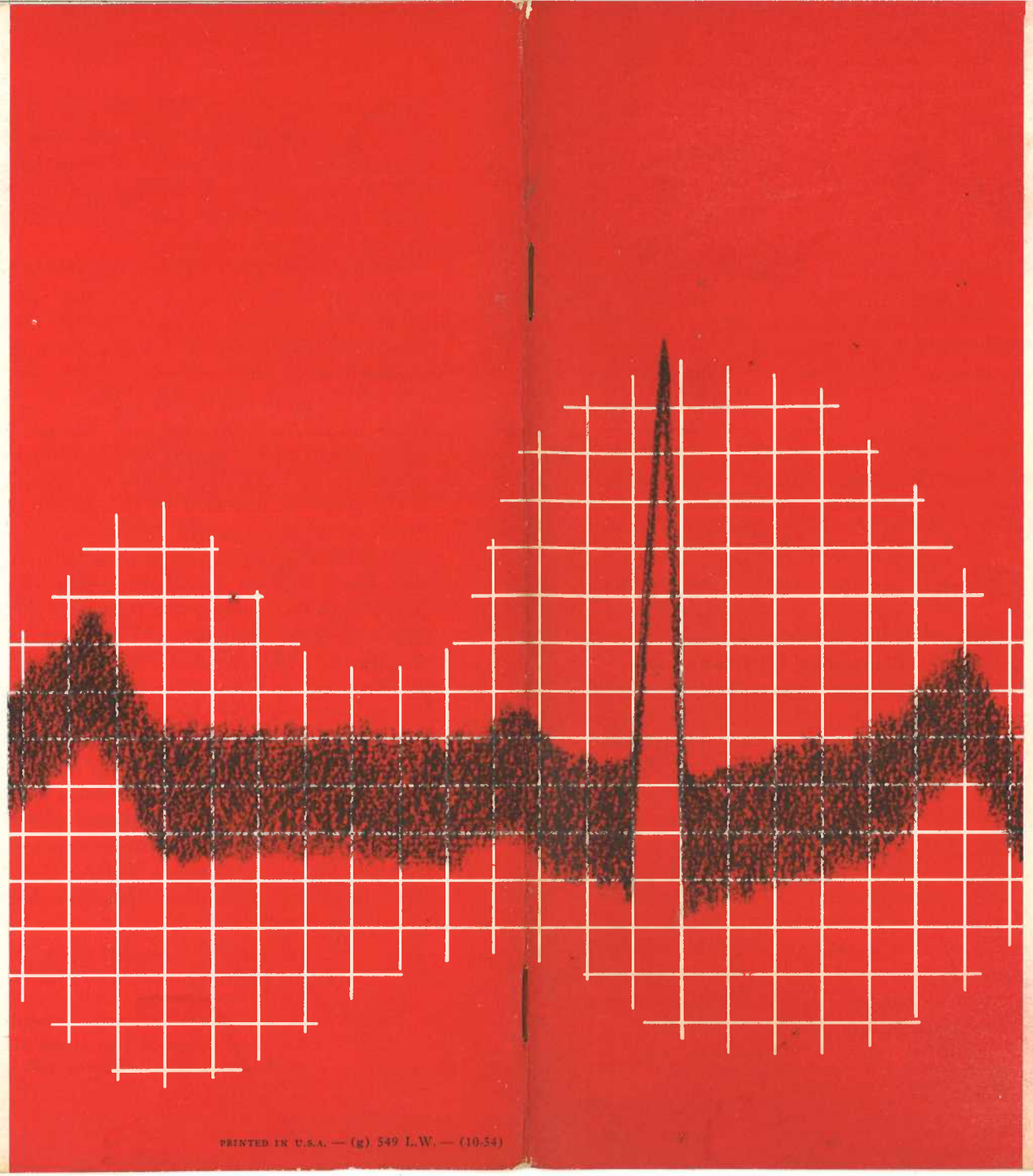

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YOUR HEART

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How much do you know about YOUR HEART?

Most people go through their 20's and 30's not giving their hearts much thought. And this is as it should be. But when people reach their 40's and 50's sometimes their attitude changes to one of fear. They may worry about getting high blood pressure or worry about the high blood pressure they have. They may read in the paper of an old schoolmate's death from a heart attack and wonder if they'll be next.

Is this worry justified? Much of it is not, although it is true that there is an actual increase in the number of older people with heart disease. For it is also true that today we have far more knowledge of how to help people with heart disease live and work happily and productively.

And if you take a look at the reasons for the increase in heart disease, you will see that they are not discouraging. Americans are living longer now than formerly, because today few lives are cut short by the infectious diseases of childhood and youth. Then, too, because of modern knowledge and methods of diagnosing disturbances of the heart and circulatory system, many illnesses that would formerly have been attributed to other causes are now properly classified as resulting from heart disease.

Brilliant new surgical techniques for the correction of defects of the heart have been developed in recent years, and these achievements and the discovery of other new treatments that offer great potentialities for the care of circulatory ailments enable medical authorities to face the future with confidence. Scientists feel that even greater progress will be made in the future — progress which will

bring large reductions in the amount of disability from heart disease.

HOW YOUR HEART WORKS

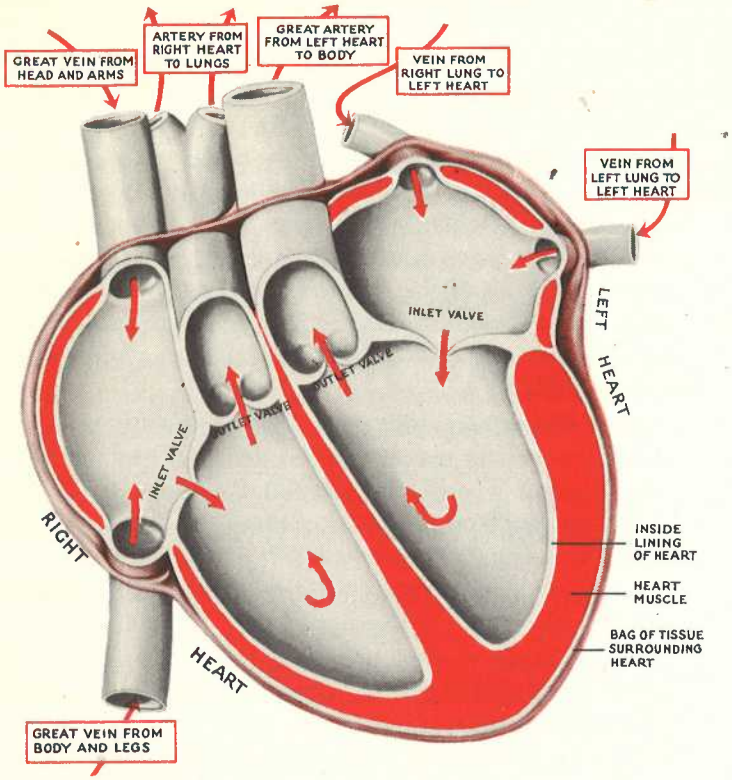
Your heart is a very strong organ. It's only about the size of a large fist, but most of its bulk is muscle. Its one job is to pump out into the arteries the blood returned to it by the veins (see the diagram). All the millions of cells in the body depend upon the rapidly circulating blood stream for life-giving oxygen and other nourishment and for the removal of wastes. The brain in particular must have a continuous supply of oxygen. Since the brain runs the body, death comes within seconds or minutes after the heart stops beating.

Your blood makes up only about 8 percent of your body weight. But to keep that blood in circulation through miles of blood vessels during an ordinary day of work, play, and rest, the healthy heart pumps from 5 to 10 tons of blood (depending on your size) at an average daily rate of 70-80 strokes a minute. Its normal pumping action is a continuous series of regular contractions and relaxations – beat–rest, beat–rest, beat–rest.

Your heart normally rests twice as much as it works. But during periods of strenuous physical activity or emotional strain, it may beat twice as fast as usual and pump out twice as much blood. The faster the heart beats, the harder it works, and the less time it has to rest. This is the reason why doctors put so much emphasis on moderation for middle-aged people and those with sick hearts.

RHEUMATIC FEVER

Perhaps you don't worry about your own heart but have a tendency to feel a little anxious sometimes about your children's hearts. If or when you do, it's reassuring to remember that only a few children out of every thousand get rheumatic fever, which precedes rheumatic heart disease, and that in recent years deaths from rheumatic fever have been sharply curtailed.



The heart is a powerful hollow muscle divided, by a wall down the middle, into two main divisions – a right and a left. Each division has two chambers which work together as a unit. The blood stream flows from the body into the right side of the heart through veins. From there it is pumped to the lungs, where it gets rid of a waste gas (carbon dioxide) collected from the body cells and picks up a load of oxygen to carry to the body cells. After passing through the lungs the blood stream flows into the left side of the heart, from which it is pumped to the body through arteries.

The drawing on this page is not an exact representation of the heart in cross-section, but rather a pictorial diagram to show the course taken by the blood from the body → to the heart → to the lungs → back to the heart → and out to the body again.

There's no need to be alarmed if you discover that one of the children's friends is ill with rheumatic fever. Your children won't catch the disease itself from being around someone who has it. Although the cause of rheumatic fever is not yet known, we do know that it works in this way: Just as a lighted match starts a fire in kindling already laid in a stove or fireplace, so an attack of a disease caused by germs of the streptococcus family – tonsillitis, scarlet fever, ear infection, streptococcal cold – often lights up rheumatic fever in a child or young adult who is susceptible to it.

What makes one child more likely to get it than another? It seems to run in families and occur more often among people who live in crowded conditions that make it easy for predisposing germs such as the streptococcus to pass from one throat to another. It is possible that faulty diet and inadequate protection from cold and dampness may also play a part.

Rheumatic fever usually begins in children at about ages 5 and 6, but it can be contracted by young adults, too. However, many cases of rheumatic heart disease in adults can be traced to mild attacks of rheumatic fever or chorea (St. Vitus' dance) in childhood.

When rheumatic fever – a disease which attacks the connective tissue of the body – attacks the brain tissue, St. Vitus' dance (twitching and jerking of the face, arms, or legs) results. In practically all cases of St. Vitus' dance the motions eventually stop. But more often rheumatic fever repeatedly attacks the connective tissue of the heart, and the heart is left permanently injured.

In the past, very few children had only *one* attack of rheumatic fever. It was far more likely that the child who had one attack would have others and that the lining of his heart (endocardium) would become so scarred that one or more of the heart valves would begin to function imperfectly. Now, however, the daily use of sulfa drugs

or antibiotics to prevent streptococcal infection will prevent recurring attacks in a majority of patients and so lessen the possibility of heart damage.

If despite precautions a streptococcal infection *is* contracted, in a majority of cases its early treatment with an antibiotic will prevent the subsequent development of rheumatic fever.

Even in the case of a child whose heart has already been permanently injured, there is cause for optimism. He can still grow up to be a happy, moderately active individual. And recently there have been dramatic advances in surgery for repairing scar-damaged heart valves.

Among the symptoms of rheumatic fever are pains in the joints and muscles, poor appetite, nosebleed, failure to gain weight, slight fever, unexplained tiredness, and St. Vitus' dance.

The child with these symptoms should be taken to a physician immediately. It is wise for every child with a first attack of rheumatic fever to be in a hospital to have his condition carefully examined and evaluated as well as to receive the medical care he needs. He must be kept in bed during the active phase to give his heart the rest it needs to make as good a recovery as possible. The doctor is the one to determine when the child can get up, how active he can be when he returns to normal living, and whether daily doses of an antibiotic or sulfa are advisable.

After his recovery he'll need, as do all children, a well-balanced diet, periodic medical supervision, plenty of sleep and rest, and ample amounts of play and sunshine.

HIGH BLOOD PRESSURE

It is an undeniable fact that high blood pressure is most often seen in middle-aged people. Undeniable, too, is that it causes a large number of deaths and a tremendous amount of disability. But the popular belief that high blood pressure (or hypertension) is caused by aging is

not based on fact. There is no reason for anyone to feel that because he is getting along in years he must be getting high blood pressure.

What then *is* the cause of high blood pressure? Sometimes it occurs with other diseases, such as kidney trouble (Bright's disease) or disturbances of the endocrine glands. In these cases, when the disease is cured, usually the hypertension is, too. When the cause is unknown, as it is in the majority of cases, the condition is called *essential hypertension.* It seems to run in families and occur more often among people who are overweight.

To gain an understanding of high blood pressure, it is first necessary to know the meaning of "blood pressure" – which is simply the pressure of the blood against the walls of the arteries. Everyone has blood pressure, and everyone's pressure goes up and down. It is highest during systole – the period when the heart pumps a fresh load of blood into the elastic-walled arteries which stretch to accommodate it – and lowest during diastole – the period when the heart pauses between beats to fill with blood. High blood pressure is commonly taken to mean high *systolic* pressure. However, the *diastolic* pressure is the more important of the two, as it represents the basic pressure exerted on the arterial walls independent of the additional pressure due to the contraction of the heart.

Another factor that makes everyone's blood pressure normally rise and fall is the behavior of the arterioles (the smallest branches of the arteries). The arterioles are controlled by nerves which make them constrict (tighten up) when you are all keyed up with joy, fear, anger, or worry. When they constrict, less blood can get into them from the arteries, and so the pressure of the blood in the arteries goes up. The arterioles dilate (open wider) when the excitement is over, and the pressure goes down.

The functioning of the nervous system is not the only cause of constricted arterioles. It is generally accepted by

physicians that certain chemical substances set free into the blood stream from various body organs and glands can also cause the arterioles to thicken or narrow. Why this happens in some people and not in others, what the relationship is between these substances and the influence of the nervous system, and why some people have a more sensitive nervous system than others are all questions that scientists are seeking to answer. They are important questions, because high blood pressure means simply that some influence keeps the arterioles of the body in a more or less constantly constricted or tightened-up state.

The effect of hypertension on the heart is what you might expect if you screwed down the nozzle of a hose connected with a water pump. Just as the pump would have to work harder to increase the pressure in the hose to keep water spraying out of the nozzle in the same volume as before, so the heart must work harder, though not necessarily more rapidly, and the pressure in the arteries must increase to keep the blood flowing through the constricted arterioles at nearly the normal rate. To take care of this extra work, the heart muscle is forced to enlarge (the first step in the development of hypertensive heart disease). And often, but not always, the walls of the arteries become scarred, thickened, and lose their elasticity – a process called sclerosis, or hardening, of the arteries (arteriosclerosis).

The blood vessels of the heart, brain, and kidneys are particularly susceptible to hardening associated with *persistent* high blood pressure. When the blood vessels of the brain are involved, what is known as a "stroke" may occur – that is, a small artery may rupture or be closed by a blood clot.

In some cases of hypertension there may be no symptoms at all; in others there may be headaches, dizziness, fatigue, flushing, or general aches and pains. If you have any of these symptoms, you should certainly see a doctor.

Sometimes high blood pressure clears up by itself before it has a chance to damage the heart and blood vessels, and sometimes it can be lowered to a safe level by diet or surgery. If you have high blood pressure, it's not very sensible to become preoccupied with your blood pressure readings, because more important than the height of the pressure is the ability of your blood vessels to stand the strain. The best things that you can do for yourself are to follow your doctor's advice carefully, and to live, as well as you can, a life of moderation in all things.

(Some people have low blood pressure or hypotension. There is no need for them to worry about this, because low blood pressure is rarely associated with illness. They can usually expect to live longer than most people.)

CORONARY HEART DISEASE

When you hear that the man down the block has "heart trouble," a good guess might be that he has coronary heart disease. For heart disease caused by disease of the coronary arteries (which have the job of supplying the heart muscle itself with blood) is an increasingly common form of heart disease between the ages of 40 and 60 and occurs much more often among men than women.

The chief cause of coronary heart disease is thickening of the coronary arteries (coronary arteriosclerosis), not infrequently associated with hypertension. Hardening of these arteries was formerly thought to be generally associated with aging, but there is now a widely-held theory that the roughening or thickening occurs when the body's mechanism for handling certain fatty particles (either eaten or developed within the body) breaks down. Intensive studies of this process are now being made.

When the coronary arteries become narrowed, the heart muscle receives a smaller amount of blood (this sometimes results in what is known as coronary insufficiency). However, the heart muscle is so strong that it is not easily affected. Many people are able to live quite

comfortably with coronary heart disease if they are careful not to place too great a strain on their hearts. Some people with a comparatively small amount of heart damage make themselves worse by worrying excessively or by refusing to slow down their pace of living.

HEART ATTACK OR CORONARY THROMBOSIS

Just about everyone is familiar with the term "heart attack," but not so many people know what it means or that the great majority of people survive their first attack.

The term heart attack usually means the sudden closing (occlusion) of a coronary artery by a blood clot (thrombus). This condition, which usually causes severe crushing pain in the chest, accompanied by weakness, pallor, and sweating, never occurs in a normal artery but only in one previously thickened or roughened. Sometimes the pain is mistaken for acute indigestion.

When such severe pain occurs, a doctor should be called immediately. He may prescribe various treatments, but most of the work of healing will be done by the body itself. When a coronary artery is closed, neighboring arteries increase in size and new branches develop to nourish the area surrounding the closed artery. During the healing period the heart needs as much rest as possible, so the patient must stay in bed for a considerable period.

In a majority of cases the healing is so successful that the patient can resume his normal activities, but sometimes some degree of insufficiency remains. If this is the case, the patient will be warned by symptoms (either difficulty in breathing or feelings of pressure or tightness in the chest) when he is overexerting. Medicine can usually relieve this discomfort.

Substances which prevent the blood from clotting (anticoagulants) may be helpful in reducing the complications of thrombosis, and sometimes they help prevent or delay it. These drugs are given only under the supervision of a physician.

CARDIAC PAIN (ANGINA PECTORIS)

When the coronary arteries are diseased, pain is often experienced even when there has been no thrombosis. It can be merely a feeling of pressure in the chest or it can be a severe strangling pain under the breastbone and radiating down the arms. It is brought on by exertion and with rest usually lasts only a few minutes. Anyone who experiences it should see a doctor, who will give him medication that will ordinarily relieve the pain almost at once. The physician will also instruct the patient in how to regulate his life and use medication to prevent or lessen the severity of such attacks.

OTHER TYPES OF HEART DISEASE

The term heart disease covers more than 20 different kinds of conditions. However, the big three – rheumatic heart disease, high blood pressure, coronary heart disease – account for the bulk of disabilities and deaths. Fortunately we now know how to prevent or cure some of the minor types.

Heart Disease Associated with Infections

The heart can become involved in practically any infectious disease, but very few cases of heart disease are caused by infections other than rheumatic fever or syphilis. This is true because nowadays so many communicable diseases are prevented by immunization or are treated successfully with serums or drugs before they have a chance to infect or weaken the heart.

Although heart disease resulting from syphilis is completely preventable, it can still occur if the syphilis is untreated. The syphilis germs (*spirochetes*) probably invade the aorta (the large blood vessel leading out of the lower left chamber of the heart) soon after they first enter the body, but actual damage does not show up until years later. If syphilis is detected early in its course, the spirochetes can be destroyed by drugs before they damage the aorta. When syphilis goes unchecked and its destructive work is uncovered years later, treatment can sometimes help relieve symptoms and retard further progress of the disease.

Congenital Defects

A very small number of babies are born with defects in the heart or blood vessels (congenital defects). Because of recent advances in surgical techniques, many of these children (including some of the so-called "blue babies") can be restored to normal or near normal life.

Bacterial Endocarditis

Bacterial endocarditis, usually caused by bacteria of the streptococcus family, is an infection of the endocardium or heart lining. Formerly very serious, it now is usually treated successfully with antibiotics. It occurs most frequently in people who have had rheumatic heart disease or who have congenital heart defects. Doctors give such people antibiotics or sulfa drugs before any operations – particularly tooth extractions and other oral surgery – as many cases of bacterial endocarditis occur after operations or deliveries. The rarer acute form develops when bacteria enter the blood stream during the course of a severe illness, such as meningitis or pneumonia. Nowadays, thanks to antibiotics, acute bacterial endocarditis is usually cured before it starts, because the underlying disease is treated effectively.

WARNING SIGNALS

Sometimes the development of heart disease is not accompanied by any symptoms; sometimes the body sends out warning signals that should be heeded immediately. They may not mean heart disease, but it is wise to see your physician if you notice any of the following:

Unusual shortness of breath – If, say, you suddenly find that you're all out of breath after climbing one flight of stairs, you're right to ask your doctor about it. Shortness of breath associated with moderate exertion can be an early symptom of a weakened heart muscle. It is caused most commonly by the congestion of blood in the lungs which occurs when

the left side of the heart fails to pump along all the blood it receives from the right side via the lungs.

A feeling of tightness or pain in the chest directly related to exertion or excitement – There are many other reasons for discomfort in the chest besides a troubled heart. The cavity of the chest and the upper part of the abdomen, which is separated from the chest by only a thin sheet of muscle, are packed tightly with organs. Any extra pressure – for example, gas in the stomach or intestine – may give rise to pain in the chest although the heart is completely well. But if you have any doubt at all about the reason for your discomfort, play safe and see your doctor.

Swelling of the feet and ankles – When the circulation is slowed up because the heart fails to pump with its customary vigor, fluid may gather in the tissues and cause swelling, which is usually first noticed in the feet and ankles. Before this condition was understood, it was called dropsy.

Unusual fatigue – If you often feel very tired even when you haven't been unusually active, it may be a sign that you have high blood pressure or a deficient heart.

But what about skipped beats, rapid beatings, palpitations of the heart (consciousness of the heart beat)? Aren't they symptoms of heart disease? Usually they are not, for, curiously enough, the heart can behave queerly and alarmingly without there being anything wrong with it. If you feel that your heart is not behaving normally, of course you'll want to see a doctor; but after he examines you, if he tells you that there is nothing wrong, *believe him!*

THE HEART-BLOOD VESSEL EXAMINATION

Is there anything you can do to prevent heart disease? The American Heart Association says, "Some forms of heart disease can be prevented . . . a few can be cured. *All heart cases can be cared for best if diagnosed early.*"

Early diagnosis is possible, of course, only if you report faithfully year after year at your doctor's office for a check-up and if you consult him in between times at the appearance of any symptoms.

If you tell your doctor you are worried about your heart or your blood pressure, the first thing he will do is ask you to describe your symptoms. Symptoms are indications of trouble which only you can feel. As they give your doctor important information about you, it is essential that you describe them accurately. He will then proceed to look for signs of trouble – things which he himself can detect with the help of various instruments and tests.

HOW'S YOUR BLOOD PRESSURE?

Your physician will measure the amount of pressure exerted by your blood against an arterial wall at the peak of the heartbeat (systole) and at the pause between beats (diastole). A series of such readings will give him valuable information about your blood pressure, but if your pressure is high, he will also need to have information about your arteries. What is the condition of the arteries? Any hardening? How much pressure can they stand?

The small blood vessels at the back of the eyes can be seen easily. Your doctor will examine them with an instrument called an ophthalmoscope and thus learn something about the condition of the important small blood vessels. From an analysis of your urine (urinalysis), and perhaps by other tests of kidney function, he will gain valuable information about the condition of your kidneys. This knowledge is important, because high blood pressure or hypertension is sometimes associated with kidney disease.

HOW'S YOUR HEART?

Usually the physician first feels (palpates) and taps (percusses) the cardiac region of the chest to determine the position, size, and shape of your heart. In addition, he may ask you to stand behind the screen of a fluoroscope while he studies the shadow of your heart cast by X-rays on the screen. To have a permanent record for further study, he may also have an X-ray picture taken.

By listening to the sounds made by your heart in action through a stethoscope, which magnifies them, the doctor

is able to hear "murmurs" or sounds indicating other deviations from normal. Heart murmurs are abnormal sounds which may or may not indicate that something is wrong with the heart. A great many murmurs have little or no importance. Others may indicate that damage has been done to the valves or heart muscle as a result of rheumatic fever or some other condition.

Your physician may also have an electrocardiogram made. This is a written record of the electrical activity which sweeps down and over your heart at each heart beat. The sensitive apparatus that does the writing at the dictation of the heart is called an electrocardiograph. A physician can tell whether the wave patterns recorded in an electrocardiogram are normal or abnormal, and so gain additional evidence about the condition and action of your heart muscle.

There are many other methods of examining the heart which your doctor will use if he thinks it necessary. He'll probably want to determine how well your heart functions by seeing how it behaves in various forms of physical exercise. Testing the extent and speed with which the red cells of the blood settle down when a sample of blood is allowed to stand in a tube (sedimentation test) is a valuable aid in studying rheumatic fever.

Recently two new diagnostic techniques have been developed that are being used with considerable success. One of these is a method of injecting into the veins of the arms an opaque material. Its progress through the heart can be followed by X-rays and thus malformations of the heart can be more easily detected.

The other method is a technique (cardiac catheterization) for testing both the amount of oxygen in the blood and the pressure of the blood in the chambers of the heart.

The development of new techniques for accurate diagnosis increases the importance of your annual check-up. Be sure to make it a yearly "must."

If your doctor finds that you have any form of heart trouble, he will tell you so. Sometimes when people are told that they have heart trouble, they begin to blame themselves. They think if only they had not exercised so much, or eaten so much, or smoked so much. They are wrong in feeling this way, for doctors today believe that although such overindulgences are harmful after the heart is diseased, they rarely bring on injury to the heart.

Your doctor has at his command many potent drugs and new surgical techniques, but even more important than what he can do for you is what you can do for yourself. So instead of blaming yourself or despairing, you will want to work out with him a new living plan and then follow it.

The object of the way of living your doctor will recommend will be the lifting of all removable burdens – for example, those imposed by fatigue, overweight, infections, and emotional upsets.

Exercise – You will want to avoid very strenuous or prolonged exertion, because it puts an extra strain on a damaged heart. But if you have high blood pressure, mild exercise will probably be prescribed, because after mild physical activity, the blood pressure tends to fall.

Your doctor will prescribe in some detail the amount of exercise you can or should take, and he'll give you some general rules to follow, such as: Don't run or walk too fast; don't walk against a high wind; don't climb stairs unnecessarily (when you do have to mount stairs, do it slowly and rest now and then); slow up in everything you do; if possible, cut down on the number of hours that you work (The American Heart Association has prepared material to help housewives with heart disease simplify their work. Ask your doctor or local heart association for it.); get as much sleep or rest as you can. But you are the one who must abide by the rules, and you are the one who, in taking exercise, must exercise judgment as well.

Eating – What does eating have to do with heart trouble? During digestion, the heart's work is increased, so the more you eat, the more work your heart must do. Also, the more you eat, the more you weigh, and carrying around an extra load of fat puts an extra strain on the heart.

A diagnosis of heart trouble or high blood pressure will probably mean not that you'll have to give up your favorite foods, but rather that you'll have to eat more moderately of them. If you're overweight, your doctor will probably advise you to diet, and if you have high blood pressure, he may suggest five or six light meals a day instead of the usual three. Or he may prescribe a low sodium diet. Many hypertensive patients have benefited from such a diet. Most doctors believe that for cardiac patients a low fat diet is preferable. But only your doctor can tell you what is best for *you*.

Smoking – If you're a confirmed smoker, you perhaps feel that smoking relaxes you. However, it seems to have the opposite effect on your blood vessels. Recent experiments have shown that when you smoke, your arterioles almost immediately tighten or constrict, and your blood pressure goes up. So of course if you have high blood pressure or hardening of the arteries, it's probably advisable for you not to smoke or to limit your smoking. Your doctor will advise you about this.

General Health Care—Run over in your mind the general rules for health that should be followed by everyone. Then underscore each rule three times, for if you have heart trouble, you should be even more careful of your general health than are your hardier colleagues. For example, everyone should see a physician regularly, but you, of course, will need to keep in close touch with a doctor, as your diet, weight, activity, amount of rest – your way of life – should have constant and careful medical supervision.

Everyone should avoid infections, but you who already have a handicapped heart must take particular care to prevent further damage to it by avoiding infections such as colds, sore throats, pneumonia, and infections of the sinuses and teeth. If you should develop an acute infection, be sure to call a doctor.

Perhaps at this point you feel that you've heard a discouragingly large number of do's and don't's – maybe you *don't* want to hear any more! But actually the general restrictions have not been so many; there is still a vast amount of enjoyable activity available to you.

So do live up to your fullest potentialities. If you have to cut out your favorite sport, why not look around for a less strenuous one? It doesn't have to be taxing to be enjoyable! As for work, most people with heart disease can and do work. Usually they are able to stay at their same jobs. Your doctor, of course, will advise you about this.

Some local heart associations have set up work evaluation clinics. And for the small number of people who must change jobs, programs to help them do this successfully have been developed in many communities. Such programs help a person decide what new kind of work he is suited for, help him train for it, and aid him in actually getting a job. Ask your doctor or your local heart association about the facilities available in your community.

People who are willing to try for serenity – who are able to go ahead with less speed and less worry, who face their handicaps without fear, coaxing their hearts along without letting their impairment become an obsession – these are the people who have the best chance for a full, happy, and lengthy life despite heart trouble.

The text of this pamphlet was prepared with the cooperation and advice of the American Heart Association, 44 East 23d Street, New York 10, N. Y. For information about other publications relating to heart disease write to that Association.

The cover design of Your Heart *is an artist's rendition of an electrocardiogram (see page 14).*